Good Agricultural & Good Handling Practices for Produce

This workshop, as well as the others around the state, address key issues that growers face when tackling food safety certification. Get an overview of audit considerations and expectations, hear from auditors and from growers who have become certified, and get a buyer’s perspective on the importance of food safety certification.

Thursday, February 17, 2011
9 a.m. – 3 p.m.
Lapeer County Michigan State University Extension Office
287 W. Nepessing St, Suite 1
Lapeer, MI 48446-2104
RSVP required by Monday, February 14, 2011

Space is limited to the first 50 registrants, so save your spot early! You MUST register for these workshops to attend!
Contact Michigan Food & Farming Systems (MIFFS) for more information or to RSVP at (517) 432-0712 or miffs@msu.edu.

There is no cost to attend, but the value is more than $50 per person, so don’t miss it! Lunch will be provided, and participants can purchase the revised, 255-page “Wholesale Success: A Farmer’s Guide to Selling, Post-Harvest Handling and Packing Produce” Manual.

Other workshop dates include:

Friday, March 11, 2011
9 a.m. – 3 p.m.
Kalamazoo Regional Educational Service Agency (KRESA)
1819 East Milham Ave.
Portage, MI 49002

Thursday, March 31, 2011
9 a.m. – 3 p.m.
The University Center at Gaylord
80 Livingston Blvd.
Gaylord, MI 49735

Funding for these workshops was provided through a USDA Specialty Crop Block Grant. Partners and sponsors include: Michigan Food & Farming Systems (MIFFS), the Michigan Department of Agriculture and Michigan State University Extension.
Good Agricultural & Good Handling Practices for Produce

This workshop, as well as the others around the state, address key issues that growers face when tackling food safety certification. Get an overview of audit considerations and expectations, hear from auditors and from growers who have become certified, and get a buyer’s perspective on the importance of food safety certification.

**Friday, March 11, 2011**
9 a.m. – 3 p.m.
Kalamazoo Regional Educational Service Agency (KRESA)
1819 East Milham Ave.
Portage, MI 49002

*RSVP required by Monday, March 7, 2011*

Space is limited, so save your spot early!
You MUST register for these workshops to attend!
Contact Michigan Food & Farming Systems (MIFFS) for more information or to RSVP at (517) 432-0712 or miffs@msu.edu or register online at [www.miffs.org/gapghp](http://www.miffs.org/gapghp).

*There is no cost to attend, but the value is more than $50 per person, so don’t miss it! Lunch will be provided, and participants can purchase the revised, 255-page “Wholesale Success: A Farmer’s Guide to Selling, Post-Harvest Handling and Packing Produce” Manual.*

Other workshop dates include:

- **Thursday, March 17, 2011**
  2 – 4 p.m.
  Online Webinar
  Register at www.miffs.org/gapghp

- **Thursday, March 24, 2011**
  2 – 4 p.m.
  Online Webinar
  Register at www.miffs.org/gapghp

- **Thursday, March 31, 2011**
  9 a.m. – 3 p.m.
  The University Center at Gaylord
  80 Livingston Blvd.
  Gaylord, MI 49735

Funding for these workshops was provided through a USDA Specialty Crop Block Grant. Partners and sponsors include: Michigan Food & Farming Systems (MIFFS), the Michigan Department of Agriculture and Michigan State University Extension.
Stakeholder Survey: Complete Set of Survey Responses

This survey was administered in December, 2011. Of the 8 partnering organizations asked to complete this survey, 7 did, providing a response rate of 87%. All survey responses were given in complete anonymity.

1. How would you rate each of the following aspects of the grant program?

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Ex</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
<th>D/K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm Food Safety workshops</td>
<td>43%</td>
<td>43%</td>
<td></td>
<td>14%</td>
<td></td>
</tr>
<tr>
<td>Farm Food Safety workshop materials</td>
<td>28%</td>
<td>43%</td>
<td>14%</td>
<td>14%</td>
<td></td>
</tr>
<tr>
<td>Food Safety Assurance (FSA) website</td>
<td>28%</td>
<td>28%</td>
<td>71%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Webinar (on FSA website)</td>
<td>28%</td>
<td>28%</td>
<td>71%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-farm mock food safety audit</td>
<td>57%</td>
<td>14%</td>
<td>28%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Involvement of food safety experts</td>
<td>43%</td>
<td>43%</td>
<td>14%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Involvement of food safety auditors</td>
<td>28%</td>
<td>14%</td>
<td>14%</td>
<td>57%</td>
<td></td>
</tr>
<tr>
<td>Involvement of specialty crop producers</td>
<td>43%</td>
<td>43%</td>
<td>14%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Involvement of my organization</td>
<td>43%</td>
<td>4%</td>
<td>14%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of MIFFS display at events</td>
<td>28%</td>
<td>14%</td>
<td>14%</td>
<td>43%</td>
<td></td>
</tr>
</tbody>
</table>

2. What was the most effective project activity this year? Why?
   a. Workshop 28%
   b. On-farm Audit 43%
   c. Removing fear of unknown in food safety
   d. Compilation of educational materials

3. What was the least effective project activity this year? Why?
   a. Involvement of MDARD GAP auditors
   b. Food Safety website not fully implemented
   c. Webinar - Low participation; possibly due to repetition of topic

The following list contains some behavioral changes you may or may not have experienced because you supported this project. Please indicate how much you agree or disagree with the following statements.

4. Because I supported this project, I now.....

<table>
<thead>
<tr>
<th>Statement</th>
<th>SA</th>
<th>Agree</th>
<th>Disagree</th>
<th>SD</th>
<th>D/K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use the educational materials to assist specialty crop producers with farm food safety issues</td>
<td>86%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Go to the Food Safety Assurance website for information</td>
<td></td>
<td>Website not launched – invalid item</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct specialty crop producers to the website for information</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have a stronger relationship with MIFFS</td>
<td>71%</td>
<td>14%</td>
<td>14%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Help producers write Farm Food Safety Plans</td>
<td>57%</td>
<td>28%</td>
<td>14%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Help specialty crop producers conduct food safety audits</td>
<td>28%</td>
<td>57%</td>
<td>14%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The following list contains some changes you may or may not have experienced because you supported this project. Please indicate how much you agree or disagree with the following statements

5. Because I supported this project, I now...

<table>
<thead>
<tr>
<th>Statement</th>
<th>SA</th>
<th>Agree</th>
<th>Disagree</th>
<th>SD</th>
<th>D/K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Know more about Good Agricultural Practices</td>
<td>71%</td>
<td>14%</td>
<td>14%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Know more about Good Handling Practices</td>
<td>57%</td>
<td>14%</td>
<td>14%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Know how to determine if a producer needs third party certification</td>
<td>28%</td>
<td>57%</td>
<td>14%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Know where to obtain information about farm food safety plans</td>
<td>57%</td>
<td>28%</td>
<td>14%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have a better understanding of what is needed to conduct an on-farm audit</td>
<td>71%</td>
<td>14%</td>
<td>14%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Know more about the needs of Mi specialty crop producers</td>
<td>86%</td>
<td>14%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The following list contains some attitudinal changes you may or may not have experienced because you supported this project. Please indicate how much you agree or disagree with the following statements

6. Because I supported this project, I now...

<table>
<thead>
<tr>
<th>Statement</th>
<th>SA</th>
<th>Agree</th>
<th>Disagree</th>
<th>SD</th>
<th>D/K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Share in the responsibility of educating specialty crop producers</td>
<td>57%</td>
<td>28%</td>
<td>14%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Share in providing resources to support specialty crop producers in the development of farm food safety plans</td>
<td>43%</td>
<td>43%</td>
<td>14%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feel that we have reduced the risks of microbial contamination of produce grown by Michigan’s specialty crop producers</td>
<td>28%</td>
<td>57%</td>
<td>14%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feel that we have reached a majority of specialty crop producers with educational workshops</td>
<td>14%</td>
<td>14%</td>
<td>28%</td>
<td>28%</td>
<td>14%</td>
</tr>
<tr>
<td>Feel that we have enhanced the ability of specialty crop producers to increase market share</td>
<td>28%</td>
<td>28%</td>
<td>43%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feel that we have increased the competitive advantage of specialty crop producers</td>
<td>28%</td>
<td>57%</td>
<td>14%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feel that this educational process should be expanded to involve direct-to-consumer producers</td>
<td>43%</td>
<td>14%</td>
<td>28%</td>
<td>14%</td>
<td></td>
</tr>
</tbody>
</table>

7. Are there any other ideas or feedback about this topic that you would like to share with MIFFS?
   a. Continuing education and discussion of food safety efforts are needed to create greater acceptance and implementation of the management practices.
   b. On-farm training is a great outreach tool because of the easy environment. It enhances learning and can be a catalyst for learning communities among farmers around food safety concerns. Farmers learn best from each other.
   c. .....organizations are working together to reach Michigan’s specialty crop producers and that can (continue to) happen with continued communication and collaboration
   d. there is not a one-size fits all food safety approach for growers. Food safety education is important, but not specifically rooted in GAP and GHP.

Please return this email survey to kmranger@frontier.com or fax to MIFFS at 517-353-7961, or mail a hard copy to 4520 W Pratt, Dewitt, 48820 by December 16, 2011. Thank-you!
Food Safety Stakeholder Survey (year)

This survey is being used to get your opinions on the Food Safety Education for Michigan’s Specialty Crop Producers (Specialty Crop Block Grant Program) activities conducted by MIFFS. We are interested in your honest answers so we can improve this program for you and others in the future.

1. **How would you rate each of the following aspects of the grant program?**

<table>
<thead>
<tr>
<th>Excellent</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
<th>Don’t Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm Food Safety workshops</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farm Food Safety workshop materials</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food Safety Assurance (FSA) website</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Webinar (on FSA website)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>On-farm mock food safety audit</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Involvement of food safety experts</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Involvement of food safety auditors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Involvement of specialty crop producers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Involvement of my organization</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of MIFFS display at events</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. **What was the most effective project activity this year? Why?**

3. **What was the least effective project activity this year? Why?**

The following list contains some behavioral changes you may or may not have experienced because you supported this project. Please indicate how much you agree or disagree with the following statements

4. **Because I supported this project, I now.....**

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Don’t Know</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use the educational materials to assist specialty crop producers with farm food safety issues</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Go to the Food Safety Assurance website for information</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct specialty crop producers to the website for information</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have a stronger relationship with MIFFS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Help producers write Farm Food Safety Plans</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Help specialty crop producers conduct food safety audits</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The following list contains some changes you may or may not have experienced because you supported this project. Please indicate how much you agree or disagree with the following statements

5. **Because I supported this project, I now...**

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Don’t Know</th>
</tr>
</thead>
</table>
   Know more about Good Agricultural Practices
   Know more about Good Handling Practices
   Know how to determine if a producer needs third party certification
   Know where to obtain information about farm food safety plans
   Have a better understanding of what is needed to conduct an on-farm audit
   Know more about the needs of Mi specialty crop producers

The following list contains some attitudinal changes you may or may not have experienced because you supported this project. Please indicate how much you agree or disagree with the following statements

6. **Because I supported this project, I now...**

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>Don’t Know</th>
</tr>
</thead>
</table>
   Share in the responsibility of educating specialty crop producers
   Share in providing resources to support specialty crop producers in the development of farm food safety plans
   Feel that we have reduced the risks of microbial contamination of produce grown by Michigan’s specialty crop producers
   Feel that we have reached a majority of specialty crop producers with educational workshops
   Feel that we have enhanced the ability of specialty crop producers to increase market share
   Feel that we have increased the competitive advantage of specialty crop producers
   Feel that this educational process should be expanded to involve direct-to-consumer producers

7. **Are there any other ideas or feedback about this topic that you would like to share with MIFFS?**

Please return this email survey to ( ) by ( ). Thank-you!

Specialty Crop Block Grant Program – Farm Bill (FY 10) Evaluation. Prepared by Kristine Ranger, M.Ed. The Learning Connection
Phone: 517.974.5697    email: Kmranger@frontier.com
Please sign in below. MIFFS needs this completed list of participants for grant reporting purposes.

<table>
<thead>
<tr>
<th>Printed Name</th>
<th>Signature</th>
<th>Company/Business</th>
<th>Address</th>
<th>Phone</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

FOR OFFICE USE ONLY: Grant Name: ________________________ Funding Source: ____________________ Staff Initials: ____________
Attachment F
As a grower you’re used to looking at your farm with production in mind. Creating a food safety or GAP Manual requires you to use a different set of eyes. This can be difficult if you have never thought of the food safety risks on your farm.

Below, you’ll find a list of potential risks grouped by major category. If the risk applies to your farm, put a check mark by it and you’ll know to address it when writing your GAP Manual. The list is not exhaustive, but is meant to be a starting point to get you thinking about potential food safety risks.

Manure

◊ Do you apply manure to your production area?
◊ Do you apply compost to your production area?
◊ Are your production areas within a mile of livestock?
◊ Are wildlife present on or near your farm?
◊ Are there any potential wildlife habitat areas (woods, wetland, river) near your production area?

Water

◊ Do you draw water for production from surface water sources or wells?
◊ Are there any surface water areas prone to flood into the production area?
◊ Is produce wash water either potable or sanitized?
◊ Is water used for washing within 10 degrees of the temperature of the produce?
◊ Is the water distribution system (pumps, valves, etc.) in good repair?

Worker Sanitation

◊ Do workers wash their hands before entering the production area, after smoking, after breaks, after lunch and after using the restroom?
◊ Do workers use the toilet instead of using the field?
◊ Do workers place used toilet paper in the toilet?
◊ Can workers recognize sick co-workers?

Facility Sanitation

◊ Do you clean and maintain all equipment?
◊ Do you clean and sanitize all food contact surfaces?
◊ Is transportation equipment regularly cleaned and sanitized?
**Good Agricultural Practices (GAP) and Good Handling Practices (GHP) Internet Resources**

These are supplemental resources found on the internet. They are here to enable you to do more studying or research on your own. Use them to inform your planning effort. They were not developed specifically for Michigan and may apply to earlier versions of a GAP program.

- **Michigan State University Extension- Agrifood Safety Workgroup Website**
  - http://gaps.msue.msu.edu/

- **Web Soil Survey**
  - Tool for generating aerial maps that also label soil types

- **Google Maps**
  - Google: http://maps.google.com/maps?hl=en&tab=wl
  - Tool for generating aerial maps

- **2010 MSU GAP Manual for Fruit and Vegetables**- 85 pages
  - Northwest Michigan Horticultural Research Station: http://www.maes.msu.edu/nwmihort/gap.html
  - This template for making a farm food safety manual has been updated to comply with the new USDA GAP Checklist

- **Step by Step Procedure to Compile Manual**
  - University of Idaho: http://www.kimberly.uidaho.edu/potatoes/gap.htm
  - Updated to correspond to new USDA GAP Checklist

- **Farm Food Safety Plan**
  - University of Maine- Potato Program: www.umaine.edu/umext/potatoprogram/gap_good_ agricultural_practices.htm
  - They are being updated to comply with new USDA GAP Checklist

- **Good Agricultural Practices Network for Education and Training**
  - Cornell University: http://www.gaps.cornell.edu/educationalmaterials.html
  - Order video tapes to help train employees on worker hygiene, signage for hand washing and proper restroom use, and other reference materials

- **Gemplers: Agricultural Supply Company**
  - Order video tapes to help train employees: http://www.gemplers.com/safety-videos
  - Order signage in English or Spanish: http://www.gemplers.com/signs-labels

- **Good Agricultural Practices: A Self Audit for Growers and Handlers include California references to rules and regulations**—54 pages

- **Summary reference document: A Combination of: Key Points of Control and Management of Microbial Food Safety: Information for Growers, Packers, and Handlers of Fresh-Consumed Horticultural Products**—7 pages
• **On-line Self Audit Quizzes Categorized by Area of Concern with automatic scoring**
  - UC Davis: [http://groups.ucanr.org/UC_GAPs/GAP_Self-Audits/](http://groups.ucanr.org/UC_GAPs/GAP_Self-Audits/)
  - Answers to the questions asked are elaborated on in the first document listed above.

• **Good Agricultural Practices**
  - New England Extension Services
    - [http://www.ipm.uconn.edu/IPM/foodsafty/toc.htm](http://www.ipm.uconn.edu/IPM/foodsafty/toc.htm)
    - Bulletins on several key topics- each are short, but to the point
      - Worker Health & Hygiene in the Field
      - Worker Health & Hygiene in the Packing House
      - Sanitation at several levels
      - Manure/Biosolids Management Practices
      - Voluntary GAP audit form from 2002

• **Good Worker Health and Hygiene Practices: Training Manual for Produce Handlers- 11 pages produced in 2004**
  - Univ. of Florida: [http://edis.ifas.ufl.edu/pdffiles/FY/FY74300.pdf](http://edis.ifas.ufl.edu/pdffiles/FY/FY74300.pdf)

• **Good Worker Healthy and Hygiene Practices: Evaluation and Importance in GAPs and GMPs- 7 pages revised in 2007**
  - Univ. of Florida: [http://edis.ifas.ufl.edu/pdffiles/FY/FY71600.pdf](http://edis.ifas.ufl.edu/pdffiles/FY/FY71600.pdf)
  - Brief text with an example of a worker health and hygiene evaluation

  - Specific Instructions for each segment of the GAP Audit from 2007

• **Farm Food Safety Brochure** key points on 2 page brochure
  - Penn State: [http://pubs.cas.psu.edu/FreePubs/pdfs/uk185.pdf](http://pubs.cas.psu.edu/FreePubs/pdfs/uk185.pdf)

• **Microbial Food Safety IS Your Responsibility!**
  - Background information for common problem microbes and why you should have a food safety plan. 7 pages.

• **Produce Traceability and Traceback: From Seed to Shelf and Beyond**
  - UC Davis Professor writes in Food Safety Magazine: [http://www.foodsafetymagazine.com/article.asp?id=2908&sub=sub1#Suslow](http://www.foodsafetymagazine.com/article.asp?id=2908&sub=sub1#Suslow)
  - What is traceability and why do we need it. Industry needs for traceability systems. 7 pages

• **Worker Hygiene Keeps Produce Clean**
  - A news-like article with information from GAP training program

• **On Farm Waste Management Fact Sheets & Bulletins**
  - Several bulletins on using biosolids under New Jersey requirements

• **GAP Program Document**
  - Sunkist: [http://www.sunkist.com/growers/ag_practices/SOPs.doc](http://www.sunkist.com/growers/ag_practices/SOPs.doc)
  - Document that Sunkist uses to confirm growers are using GAPs
  - Good example of what buyers are expecting to address various risks 10 pages.
INTRODUCTION

Good Agricultural Practices (GAP) is a series of on-farm practices designed to minimize the risk of food contamination, maintain a clear record of how food was produced, handled and stored; and ensure people buying produce that it is coming from a clean, well-managed environment. The application of the practices on a farm may be verified by third party audits, depending on the policies of the customer. (Adapted from Wholesale Success: A Farmer’s Guide to Selling, Postharvest Handling and Packing Produce, published by FamilyFarmed.org; and USDA Fresh Audit Verification Program).

For more information about GAP, please visit the national GAPsNET site at [http://www.gaps.cornell.edu/](http://www.gaps.cornell.edu/).

Producers who are preparing for a GAP audit can receive assistance from one of the following Michigan State University Extension Educators. Contact the person in your area to discuss your needs:

<table>
<thead>
<tr>
<th>Name</th>
<th>Position/County</th>
<th>Contact Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steve Fouch</td>
<td>County Extension Director, Benzie County</td>
<td>Benzie County, 448 Court Place, PO Box 349, Beulah, MI 49617, (231) 882-0025, <a href="mailto:fouch@msu.edu">fouch@msu.edu</a></td>
</tr>
<tr>
<td>Chris Long</td>
<td>Crop and Soils Science Specialist, Campus 412 Plant and Soil Science Bldg, East Lansing, MI 48824</td>
<td>(517) 355-0271 x1193, <a href="mailto:longch@msu.edu">longch@msu.edu</a></td>
</tr>
<tr>
<td>John Pullis</td>
<td>ANR Educator, Presque Isle County</td>
<td>Presque Isle County, 151 East Huron Ave, PO Box 110, Rogers City, MI 49776, (989) 734-2168, <a href="mailto:pullisj@msu.edu">pullisj@msu.edu</a></td>
</tr>
<tr>
<td>Hannah Stevens</td>
<td>District Vegetable Educator, Macomb County</td>
<td>Macomb County, Verkuilen Building, 21885 Cunham Road, Clinton Township, MI 48036, (586) 469-6440, <a href="mailto:stevensh@msu.edu">stevensh@msu.edu</a></td>
</tr>
<tr>
<td>Carlos Garcia</td>
<td>Small Fruit Educator, Ottawa County</td>
<td>Ottawa County, 12220 Fillmore Street, Suite 122, West Olive, MI 49460, (616) 994-4580, <a href="mailto:garcias4@msu.edu">garcias4@msu.edu</a></td>
</tr>
<tr>
<td>Norm Myers</td>
<td>County Extension Director, Oceana County</td>
<td>Oceana County, 210 Johnson St, Hart, MI 49420, (231) 873-2129, <a href="mailto:myersn@msu.edu">myersn@msu.edu</a></td>
</tr>
<tr>
<td>Bill Steenwyck</td>
<td>District Vegetable Educator, CHES</td>
<td>CHES, 9302 Portland Rd, Clarksville, MI 48815, (616) 693-2193, <a href="mailto:steenwyk@msu.edu">steenwyk@msu.edu</a></td>
</tr>
<tr>
<td>Phil Tocco</td>
<td>ANR Educator, Jackson County</td>
<td>Jackson County, 1715 Lansing Avenue, Suite 257, Jackson, MI 49202, (517) 788-4292, <a href="mailto:tocco@msu.edu">tocco@msu.edu</a></td>
</tr>
</tbody>
</table>

**NOTE:** Before selecting an auditor, producers are advised to contact their buyer(s) about their requirements for GAP audits and auditors.
<table>
<thead>
<tr>
<th>COMPANY</th>
<th>LOCATION</th>
<th>CONTACT INFO</th>
<th>DESCRIPTION</th>
<th>SERVICES OFFERED (Ag/Food Safety Only)</th>
<th>COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIB International</td>
<td>1213 Bakers Way, PO Box 3999</td>
<td>E-mail (for agricultural audits): bernst@ai bonline.org</td>
<td>Qualified to conduct certification audits for GFSI (BRC Global and SQF)</td>
<td>Agricultural Audits – validates food safety program for retailers, strengthens GAP and food safety on ranch/farm evaluates programs and processes</td>
<td>Contact the AIB office for an estimate of audit costs and other services</td>
</tr>
<tr>
<td></td>
<td>Manhattan, KS 66505</td>
<td>Phones: 800-633-5137, Phone: 785-537-1493, Website: <a href="https://www.ai">https://www.ai</a> bonline.org/</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NSF Davis Fresh</td>
<td>195 Aviation Way, Suite 101</td>
<td>Email: <a href="mailto:solutions@nsfdavisfresh.org">solutions@nsfdavisfresh.org</a></td>
<td>Provider of food safety solutions for the produce industry, including growers, shippers, processors, distributors, and retailers across the country and around the world. Delivers field evaluations, laboratory testing, consulting, and training so to supply customers with the safe, consistent produce. Provides its customers with audit templates, updates to criteria, user-friendly information, and enhanced reporting.</td>
<td>Davis Fresh – GAP certification. Field evaluations, lab testing, consulting and training. GFSI Certification - NSF Davis Fresh is recognized provider of third-party audits with expertise in BRC, SQF, and GlobalGAP. Organic Food Certification – certifies to NOP standards.</td>
<td>Contact the Davis Fresh office for an estimate of audit costs and other services</td>
</tr>
<tr>
<td>Primus Labs</td>
<td>2810 Industrial Parkway</td>
<td>E-mail (for field audits scheduling): Go to <a href="http://www.primuslabs.com/cus/">www.primuslabs.com/cus/</a></td>
<td>Provides GAP audits designed to provide buyers and sellers an effective supply chain review of their safety and/or quality programs, including BRC and GLOBALGAP.</td>
<td>Third party verification for the client's safe food production program. Primuslabs.com auditors conduct the following audits: ranch audits, harvest crew audits, cooling/cold storage audits, packing house audits, processing facility audits, and greenhouse audits. These audits cover industry established guidelines for Good Agricultural Practices (GAP) and Good Manufacturing Practices (GMP). HACCP modules can be requested for Packinghouse and processing audits. Organic Food Certification – certifies to NOP standards.</td>
<td>Contact the PrimusLabs office for estimate of audit costs and other services.</td>
</tr>
<tr>
<td></td>
<td>Santa Maria, CA 93455</td>
<td>Phone: 800-779-1156, Fax: 805-922-2462</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMPANY</td>
<td>LOCATION</td>
<td>CONTACT INFO</td>
<td>DESCRIPTION</td>
<td>SERVICES OFFERED (Ag/Food Safety Only)</td>
<td>COST</td>
</tr>
<tr>
<td>---------</td>
<td>----------</td>
<td>--------------</td>
<td>-------------</td>
<td>---------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>USDA</td>
<td>1400 Independence Avenue SW Room 1661, Stop 0240 Washington, D.C. 20250-0240 Michigan: Michigan Department of Agriculture P.O. Box 30017 Lansing, MI 48909 USDA, AMS, Fresh Products Branch Park Place Office Center 7445 Allen Road, Suite 108 Allen Park, MI 48101</td>
<td>Kenneth S. Petersen Audit Programs Coordinator Fresh Products Branch USDA, AMS, Fruit and Vegetable Programs Phone: (202) 720-4560 FAX: (202) 720-8871 E-mail: <a href="mailto:ken.petersen@usda.gov">ken.petersen@usda.gov</a></td>
<td>AMS, in partnership with state departments of agriculture, offers a voluntary, audit based program that verifies adherence to the recommendations made in the Food and Drug Administration’s <a href="https://www.fruitandvegetableprograms.org/pdfs/GAP%20Guideline%202013.pdf">Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables</a>.</td>
<td>GAP for primary producers and GHP (Good Handling Practices) for packing, storage and wholesale distribution. NOTE: Program requirements have changed as of November 9, 2009 to incorporate the traceback portions as a mandatory component of GAP and GHP audits rather than a voluntary component.</td>
<td>$92/hour for travel time and audit time (MI information)</td>
</tr>
<tr>
<td>Michigan</td>
<td>Colleen Bess Phone: 517-373-0280 E-mail: <a href="mailto:collierc@michigan.gov">collierc@michigan.gov</a></td>
<td>Robert McCully Phone: 517-241-2978 E-mail: <a href="mailto:McCullyR@michigan.gov">McCullyR@michigan.gov</a></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Michael Moore Phone: 313-928-0954 E-mail: <a href="mailto:michael.moore@usda.gov">michael.moore@usda.gov</a></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** Before selecting an auditor, producers are advised to contact their buyer(s) about their requirements for GAP audits and auditors.
Good Agricultural Practices

for Small Fruit Growers
If I learn only 1 Thing….

It’s that every unique operation needs to have GAPs that are tailored by commodity and management practices in order to effectively reduce microbial risks and prevent contamination on each farm everyday.
Two Types of Food System Standards

Public standards
- Government laws and regulations (Federal, State, Local)
- International Trade: Codex Alimentarius Commission
- Tend to focus primarily on risks due to food hazards

Private Standards
- Driven by the food industry: retail buyers, buyer organizations, commodity groups, NGOs, etc.
- Often consider food hazards (perhaps not risk-based) as well as environmental issues and corporate social responsibility objectives.
Why Should We Care?

Every year foodborne illnesses result in an estimated:

• 48 million cases of foodborne illness.

• Less than 200,000 are produce related.

• Economic losses between 10-83 billion dollars.
Produce Associated Outbreaks Affect Business

1996

2006
Global Shifts in Scope

Uzbekistan Food Safety Study
The World Bank & World Health Organization

Value Chain for Selected Food Stuff and Possible Entry Points for Food Safety Risks

Tashkent, March 2008
PREVENTION is the Key to Reducing Microbial Contamination of Fresh Fruits and Vegetables
What Can We Do To Minimize the Risks?

Focus on risk reduction, not risk elimination.

“Current technologies cannot eliminate all potential food safety hazards associated with fresh produce that will be eaten raw.”

*Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables*
Good Agricultural Practices to Reduce Risks of Microbial Contamination

Salmonella 26

E. Coli 0157:H7 22

B. cereus 1

Campylobacter 2

ET E. Coli 2

E. Coli 011:H43 1

Shigella 3

Source: CDC Foodborne outbreak surveillance system
Contamination With Microbial Pathogens: Where Can It Occur?

- In fields or orchards
- During harvesting and transport
- During processing or packing
- In distribution and marketing
- In restaurants and food service facilities
- In the home

FARM to FORK
Evaluate the Whole Operation

Pre-plant to Post-Harvest

- Irrigation and Wash Water Sources
- Manure Source, Use, and Handling
- Employee Training and Hygiene
- Farm and Equipment Sanitation
Reduce Post Harvest Loss

- Post-harvest management practices that reduce loss to spoilage or shrinkage will reduce risks.
- These include sorting, quick cooling, chlorinated wash water, and good refrigerated storage and shipping.
Review Field Management Practices to Reduce Risks

- Manure
- Water quality
- Worker and field sanitation
- Post harvest handling
- Transportation
Manure = Fecal Matter = Microbes

- **Human or animal:** DO EVERYTHING you can to keep manure off produce.
- **Preventing contamination** is the goal.
Manure

- Time application properly.

- Manage compost piles to achieve high temperatures to kill potential pathogens.

- Know the source.
Exclude Animals and Children

- Keep wildlife out of production areas as much as possible.
- Manage rodents and birds in packing houses and storage areas.
- No dogs, cats or children in the fields.
Water Carries Pathogens

- *E. coli* 0157:H7 viewed primarily as a water-borne pathogen.
  - Many outbreaks associated with recreational water.
- *Salmonella, Giardia* and *Cyclospora* outbreaks on produce caused by contaminated water.
Water Management

• Know the source of the water and intended use.

• Evaluate the irrigation method.

• Test water at least annually for generic E. coli and keep records of all water test results.
Spray Water Quality

- **Use potable (drinking) water for pesticide sprays.**
- **When potable water is not available, test water quality and keep records.**
- **Low water volumes reduce risk.**
Why Focus on Water Disinfection?

Singular critical point capable of amplifying an error in sanitation or hygiene management during production, harvest, or postharvest
Chlorination of Water

Chlorination reduces contamination

- Maintain constant chlorine by monitoring. In general 100-150 ppm.

- Monitor pH of water. Optimum range 6.0-7.0

- Be conscientious of the temperature of the water. High temp. results in quicker pathogen kill, but also results in rapid loss of chlorine due to gas formation.
Wash Water Quality

• Use potable water for all produce washing, cooling, dipping, icing, and processing.

• Avoid water temperatures in dump tanks that are more than 10°F cooler than produce.
Postharvest Water Disinfection Strategies

- Some Options: Chlorine gas, Sodium hypochlorite, Calcium hypochlorite, Chlorine dioxide, Acidified sodium chlorite, Surfactants, Ozone, Ionizing radicals, Hydrogen peroxide, Peroxyacetic acid, Ultraviolet Illumination.

- Monitoring effectiveness is paramount to success.

Bacteria can enter the stem scar with improper handling or wash water management.

Fruit pulp must be < 10°F warmer than water temperature to prevent infiltration.

Postharvest water disinfection is an important preventive practice, even for an acid vegetable like tomatoes. Historically thought to be safe, outbreaks in 1990, 1993, and 1999 were caused by Salmonella spp.
Harvest Considerations

• Ideally pick dry fruit or vegetable.
• Leave fruit that has bird droppings on it.
• Clean and sanitize totes daily.
• Cool product quickly.
• Teach workers about proper handwashing.
Promote Cleanliness at U Pick

- Invite customers to wash their hands prior to entering the fields.
- Provide clean and convenient restrooms for customer use.
- Supply soap, clean water, and single-use towels for hand washing.
What is Proper Handwashing?
Proper Handwashing

- Reduces infection 35 to 50%
- Reduces GI-illness up to 80%
Farm Worker Hygiene

• Teach workers about food safety and their role in preventing microbial contamination of fresh fruits and vegetables.

• Provide clean restrooms with soap, water, and single-use towels.

• Enforce proper use of facilities.
Is Worker Training Really a Priority?

• Farm workers are your first line of defense.
• Workers are capable of learning about food safety.
• Effective training results in better employees and safer produce.
Harvest Sanitation

- Clean and sanitize storage facilities prior to harvest.
  - Clean and sanitize harvest bins daily.
  - Avoid standing in harvest bins.
- Clean and sanitize packing area, equipment, and floors daily.
Growers Are Innovating Their Own On-Farm Sanitation Routines
Develop a System for Maintaining Carton and Tote Hygiene
Packing House Sanitation

- Proper sorting and culling of produce.
- Detectable Free Chlorine in Wash Waters.
- Enforce Good Worker Hygiene.
- Exclude all animals from Packing Shed, especially insects, birds and rodents.
- Clean and Sanitize Equipment.
Control Sources of Rodent and Bird Contamination
Transportation and Distribution
Cleanliness and Sanitation

- Pre-clean and Pre-rinse
Shipping Container Sanitation is Critical

- Ask the freight company for a detailed log of previous loads.
- Ask them to clean and sanitize containers between loads.
- Inspect the truck that transports your produce.
Transportation Unit Inspection Checklist

• Is the area where food will be loaded dirty?
• Does the loading area smell bad?
• Is there any water condensation on the walls?
• If the fresh commodity requires refrigeration during transportation, is the refrigeration equipment functioning properly?
Refrigerated trailer in good condition.
Damaged air delivery chute in a refrigerated trailer.
Traceback and Positive Lot Identification
What is a Farm Food Safety Plan?

A “roadmap” for actively reducing food safety risks on the farm.

• Manure storage and handling

Record It or Regret It!

• Irrigation and water quality
• Equipment sanitation
• Harvest and post harvest handling
• Employee training
• Crisis management
Developing a Farm Food Safety Plan

- List what you do from planting preparation to postharvest handling
- Pay attention to where contamination is a risk.
- How can you monitor or measure the risk?
- Consider changes to reduce risk.
- Document changes and continue to measure or monitor the risk.
If you did not RECORD IT, you did not do it.

- Record keeping allows you to keep track of farming operations and worker training.
- Record keeping documents your activities should this information ever be required.
Points to Remember in your GAP Manual

- All the auditor is looking for is “Do you have a plan?” and, “Are you carrying it out?”
- Daily means daily.
- More documentation is better than less.
Points to Remember on the Audit

- Have your documents in order.
- Be nice to the auditor.
- Auditors will walk your fields looking for hazards, like…
  - Trash
  - Signs of animals
  - Broken or leaky equipment.
Good Agricultural Practices for Managing Food Safety Risks Continue to Evolve

As new research becomes available, recommended practices may change.
Be Active and Be Ready

- Make changes to management practices as needed.
- Keep good records of all production practices.
- Teach employees the importance of prevention strategies and provide proper facilities.
- Update your plan at least annually.
Many Resources are Available to Growers and Packers

- Grower’s Guide
- A Quick Look at GAPs
- CD-ROM
- Resource Manual
- Farm Checklist
- Exhibit & Posters
- Farm Worker Education Materials
Where To Go For More Info

- MSU Extension has a network of trained educators near you.
- Employee Training videos are available at select extension offices to borrow.
- You can also find help and GAP Manual templates on our website at: www.gaps.msue.msu.edu
Acknowledgements

This presentation was created in large part by Elizabeth A. Bihn, Anusuya Rangarajan, Trevor V. Suslow, Robert B. Gravani, Marvin P. Pritts and Randy Worobo with additions by MSUE Agrifood Safety Team and Warren King.

Images provided by USDA, Getty Images, Trevor V. Suslow, Anusuya Rangarajan, Elizabeth A. Bihn, Robert B. Gravani, Al B. Wagner, Matthieu Ngouajio, Barbara Bellows, Donna L. Scott, Phil Tocco and Ed McLaughlin.
The End
Illustrated Guide to Growing Safe Produce on Your Farm

Good Agricultural Practices

G.A.P.s

What Every Farmer Should Know ...and Do!

The National Sustainable Agriculture Information Service, ATTRA (www.attra.ncat.org), was developed and is managed by the National Center for Appropriate Technology (NCAT). The project is funded through a cooperative agreement with the United States Department of Agriculture’s Rural Business-Cooperative Service. Visit the NCAT website (www.ncat.org/sarc_current.php) for more information on our other sustainable agriculture and energy projects.

Funding for the development of this publication was provided by a grant from USDA/NIFA Outreach and Assistance to Socially Disadvantaged Farmers and Ranchers (OASDHF).
The Importance of Food Safety

Farmers play an important role in preventing food-borne illnesses through their use of good agricultural and management practices. There are many ways that farmers can reduce the risk of contamination of their produce, such as:

- The proper use (and disposal) of water,
- Proper compost and application of manure,
- Good hygiene habits from the workers in the farm,
- Regular equipment checkup and maintenance,
- Proper sanitation of processing surfaces and transportation vehicles,
- Accurate record keeping.

With these practices, a farmer is not only contributing to a better and safer food system, but also creating more consumer confidence about the farmer’s product and farm while reducing the potential liabilities from a food-borne outbreak.

Pathogens: The Bad Bacteria that Cause Disease

Humans, animals, and plants all co-evolved with bacteria that are considered normal, and even necessary, residents of our skin, mucosal membranes, and digestive tract, and, in the case of plants, their roots and leaves. These bacteria are benign inhabitants—they don’t cause disease. Pathogens are bacteria that are not normally present in humans, animals or plants, and when they show up, they can cause disease. The good agricultural practices described in this publication were developed to reduce their presence in fresh produce, decreasing the likelihood of disease outbreaks.

The most common bacteria that cause illness are:

**Campylobacter**

Campylobacter is the most common cause of bacterial food-borne illness. The Centers for Disease Control estimate that 2.4 million persons are affected each year (www.cdc.gov/nczved/divisions/dfbmd/diseases/campylobacter/technical.html). It is commonly found in the intestines of warm-blooded birds and mammals. Food is the most common vehicle for the spread of campylobacter, and produce may be contaminated by animal feces in the fields where raw fruits and vegetables are grown. Most human illness is caused by one species, *Campylobacter jejuni*, and the disease is characterized by symptoms such as diarrhea (often bloody), abdominal cramps, and fever. The illness lasts one week.

**Salmonella**

Salmonella is a bacterium that causes the disease salmonellosis, with roughly 40,000 cases reported annually in the U.S. These bacteria, which live in the intestinal tract of mammals and birds, are usually transmitted to humans by eating food contaminated with animal feces, including food contaminated by food handlers who didn’t use a proper handwashing technique. The disease is characterized by diarrhea (sometimes bloody), fever, and abdominal cramps. Salmonella infections can occasionally be localized, or become systemic by entering the blood.

**Escherichia coli (E. coli)**

*E. coli* are a large and diverse group of bacteria. Experts think that there might be about 70,000 infections in the U.S. annually with *E. coli* O157, a particularly dangerous “Shiga toxin-producing” *E. coli*, or STEC. STEC live in the guts of ruminant animals, including cattle, goats, sheep, deer, and elk, but have also been found in pigs and chickens. The major source for human illness is cattle. Infection starts when food contaminated with human or animal feces is eaten. *E. coli* most commonly cause diarrhea.

---

Related ATTRA publications

- Publications available from ATTRA by phone (1-800-346-9140) or Web (www.attra.ncat.org)
- **Start a Farm in the City:** Has information about urban soils and mitigating contaminated soil.
- **New Markets for Your Crops:** Outlines some approaches to finding new markets, some of which might require a GAPs plan.
- **Protecting Water Quality on Organic Farms:** Overview of practices to support good water quality on your farm.
- **Farmscaping to Enhance Biological Control:** Includes discussion of approaches to developing hedgerows, which can act as buffers to protect crops from contamination.
A Salmonella outbreak related to fresh produce has sickened 20 people, three of them hospitalized. Health authorities warned the public to avoid eating raw/undercooked vegetables. Federal and State agencies are working closely with the Health Department to determine the source of the outbreak.

ONE MORNING PETE VISITS HIS NEIGHBOR, SAM

Hi Sam, what’s up? Hi Pete, did you notice the headline in today’s newspaper? It’s alarming news!

This really worries me, Pete. What if the source of the outbreak had been my farm? Aren’t you worried?

Not really, Sam. I rely on my good records and GAPs.

Sounds like a lot of work. Actually, GAPs aren’t rocket science. Following GAPs can benefit your farm operation in several ways:

GAPs? What is that? GAPs stands for Good Agricultural Practices. They’re voluntary guidelines to reduce food safety hazards on your farm operation.

Some farmers’ market managers and restaurant owners feel more comfortable buying my produce if they know I follow GAPs.
Some Benefits of Having a GAPs or Food Safety Program for Your Farm Are:

- Reduces the risk of produce contamination and contributes to a safer product.
- Allows easier access to markets concerned about food safety issues.
- In case of a food safety issue in your area, good records can prove your safety practices and avoid or reduce liability.

Clean Soil: Minimize human pathogens in the soil.

Clean Water: Water quality should match its intended use. For example, water used for washing and processing should be of drinkable quality.

Clean Hands: Workers should use good personal hygiene in the field and in the packing house.

Clean Surfaces: Proper washing and sanitation of working surfaces, packing bins, transportation vehicles, etc.
So let’s talk about each of these starting with soil and working down the list.

Before farming this land I looked for potential sources of soil contamination such as raw animal manure, toxic residues and sewage drainage.

* For urban farms refer to ATTRA’s “Start a Farm in the City” pp. 9-12.

On the farm, the crops are located away from the animal pens to avoid contaminating the crops with runoff.

That is a very smart thing to do, but what if my land is flat?

Then you can use physical barriers like ditches, berms, hedgerows or grass berms.

Ditch...

Grassed Berms...

Hedgerows...
The manure composting pile is located a safe distance away from the fields and water sources.

We store manure in windrows located on a slightly sloped surface.

We turn the pile regularly to secure aeration and high temperatures within the compost pile. We maximize the time between manure or compost application and harvest, to minimize risk of contaminating edible parts of the plant.

You can usually buy compost. When buying compost off-farm, it’s important to consider:

Delivery rates

The source of the compost

The nutrient content

The pathogen load

See page 16 for a list of testing laboratories.
MAKE SURE YOU KEEP WRITTEN RECORDS* OF HOW YOU PRODUCE AND APPLY YOUR COMPOST

So, these records can be important in case of food safety problems?

EXACTLY

THAT’S RIGHT. SO YOU WANT TO MAKE SURE THERE ARE NO DEAD ANIMALS, MANURE SOURCES OR OTHER STUFF THAT COULD POLLUTE THE CREEK.

I USE FURROW IRRIGATION ON MY FARM

FURROW IRRIGATION AND HIGH PRESSURE SPRINKLERS ARE MORE LIKELY TO CONTAMINATE EDIBLE PARTS OF THE PLANTS.

LETS ME EXPLAIN: FURROW IRRIGATION WATER CAN COME INTO CONTACT WITH LEAVES AND FRUITS OF THE PLANT.

After discussing soil and compost, Pete moves on to discuss the importance of clean water.

This creek is one of our two water sources. Since it is surface water, I use it only for irrigation and not for washing produce or cleaning hands.

Is that because it has a higher risk of being contaminated?

And speaking of contamination, to reduce risk even more I use drip irrigation.

With drip there is:

• Less contact of water with leaves, stems and fruits,
• Efficient use of water,
• Easier management of irrigation schedule.

*See page 19 for manure and compost application and production record keeping documents and see page 14 for specific National Organic Program regulations for composted manures.
As for high pressure sprinklers, sprinkler drops splash dirt onto the leaves and fruits.

And for any foliar sprays, I use water that’s safe to drink.

Where do you get that water from?

That’s a deep subject... we use well water.

...and to make sure my well water is clean, my well is:

Located away from animal pens.

Slightly elevated cement base.

No cracks in base or top to prevent contamination from surface water.

How do you get your workers to follow GAPs?

I train my workers about the importance of good hygiene and how it relates to food safety.

I make sure everyone understands it is in their interest to support food safety practices to maintain sales and jobs.

I make sure everyone understands it is in their interest to support food safety practices to maintain sales and jobs.

Important points to emphasize at worker food safety workshops are:

- Make sure workers understand the connection between microbial risks, personal hygiene, food contamination, and how GAPs reduce these risks.
- The importance of reporting illness.
- The importance of simple practices such as keeping produce crates off the soil, and
- Hand washing after toilet use, eating, taking breaks, etc.
- Teach a proper and effective hand washing technique. **

** for a proper hand washing technique, refer to page 11.
I also provide easy access for all my workers to clean portable bathrooms and handwashing stations and I keep records of its cleaning schedule.

And last, but not least: clean surfaces. I have a standard procedure to clean and protect all bins and harvest aid equipment.

Liquid soap dispenser. Potable water. Single-use paper towel dispenser. High pressure wash, then rinse and dry all containers. Cover containers that are not going to be used right away.

GARBAGE CAN WITH LID.

Never stand on bins.

Avoid stacking crates and containers after they have been in contact with soil.

One of my workers came up with a clever solution: A stand that keeps the harvest crate from coming into contact with the soil.

Other farm equipment that is usually neglected, but should also be routinely cleaned and sanitized includes:

- Tables
- Personal hand tools
- Buckets
- Produce wash bin

Inside the packing house consider these risk management practices:

- The packing facilities and equipment should be clean and sanitized at the end of each day.
- All food scraps, grains, and culls should be removed to avoid attracting pests.
- There should not be any animals or pests present in the packing house.
Our farm has a documented trace back program with I.R.Q. traceability standards in the event of a recall.

What does I.R.Q. mean?

That means that all boxes leaving our farm have the following information:

I = identity of what is inside the box
R = responsible party: name and address of individual responsible for packing the product.
Q = quantity: amount in box, weight or count. (also date of harvest).

We keep records of our large volume buyers, in case we identify contamination in our farm, our customers are able to prevent any further spread of an illness.

...and having guidelines and training for all these procedures makes it easier for everyone, especially new workers.

Thanks Pete, you have given me a lot to think about.

I’m glad to help putting a GAPs plan into action takes some time and effort but it reduces your risk of food safety problems.

And remember, an integral part of any food safety program is documentation of your GAPs.

• Keep up-to-date records for all chemical applications.
• Toilet and hand washing station maintenance records
• Cleaning and sanitizing records
• Worker training
• Injury reports
• Pest control plan and records
• Traceback and system recall.

Sam leaves Pete’s farm with a bunch of good ideas to improve food safety on his farm.

Clean soil
Clean water
Clean hands
Clean surfaces
Good record keeping

Here’s a pamphlet I got from ATTRA with good resources and info about GAPs.

You can request a free printed copy of the pamphlet by calling ATTRA 1-800-346-9140.
Proper Handwashing Technique

- Wet hands with clean, warm water, apply soap, and work up a lather.
- Rub hands together for at least 20 seconds.
- Clean under the nails and between the fingers.
- Rub fingertips of each hand in suds on palm of opposite hand.
- Rinse under clean, running water.
- Dry hands with a single-use towel.

From Food Safety Begins on the Farm: A Grower’s Guide. Cornell University.

Biodiversity and Food Safety on the Farm

Biodiversity is the number and variety of organisms found within a specified geographic location. Biodiversity is important to sustain farm ecosystems because biodiverse soils function better than non-biodiverse soils—they have superior ability to absorb and hold water, are less prone to wind and water erosion, and, through interactions between soil organisms and the plant, biodiverse soils make available a wider range of nutrients to the plant than non-biodiverse soils. A biodiverse farm also retains many checks and balances against outbreaks of pests. Conversely, lack of biodiversity and lack of habitat for beneficial organisms can lead to overuse of pesticides, which is a food safety concern. However, a few species of animals on the farm can present food safety risks if adequate measures are not adopted. The following table lists animal species, the food safety risk they represent to your crops, and actions farmers should take to avoid contamination of produce.

<table>
<thead>
<tr>
<th>Relative Risk to Unprocessed Produce from Animal Presence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic Animals</td>
</tr>
</tbody>
</table>
| Cattle | Very High | • Prevent contamination of cropland, and water sources used for crop management, with pasture and rangeland runoff.  
• Use grasses and vegetable buffers between crops and grazing lands.  
• Rest grazing areas at least a week prior to irrigation.  
• Filter runoff through wetlands.  
• Avoid feeding on confined areas, use healthy pastures.  
• Use certified compost or make sure farm-made compost is adequately managed.  
• Use hedgerows or windbreaks to avoid possible dust containing manure blowing into crops. |
| Non-Domestic Animals | Food Safety Risk | What a Farmer Can Do |
| Feral pigs | Moderately Low | • Monitor fields for feral pig intrusion. Define no-harvest zone if fecal matter is identified.  
• Hunt the pigs or install hog wire fence.  
• Removing habitat doesn’t work. |
| Wildlife | Food Safety Risk | What a Farmer Can Do |
| Deer | Low | • Use inexpensive feeding attractants away from crops.  
• If high deer activity: discourage animals with loud noises, motion sensors, food attractants, and fencing as last resource.  
• Do not remove habitat that protects water quality. |
| Rodents | Moderate | • Don’t grow crops eaten raw near concentrated cow manure. |
| Field Rodents | Low | • Removing habitat that filters pathogens in water is counterproductive. |
| Birds near cattle operations or polluted areas | Low | • Do not plant or at least do not harvest in areas where birds consistently perch directly over planted beds. |
| Amphibians and reptiles | Low | • Make sure that nearby riparian areas are not unnaturally depleted of water during the crop season. Conserve habitat. |
| Insects | Low | • Do not grow crops eaten raw next to areas of concentrated cow manure.  
• Do not harvest crops impacted by high populations of flies close to harvest. |

Resources

Food Safety and Good Agricultural Practices (GAPs)
Several universities and extension services have publications and resources regarding food safety and GAPs. Some of them are listed below:

Iowa State University. University Extension Publications:
On-Farm Food Safety: Guide to Good Agricultural Practices (GAPs)
Learn how to develop a food safety plan on the farm that documents your risk reduction efforts.
www.extension.iastate.edu/Publications/PM1974a.pdf

On-Farm Food Safety: Guide to Food Handling
Details of safe food handling habits related to health, hygiene, and handwashing for all farm workers.
https://www.extension.iastate.edu/store/ListItems.aspx?Keyword=guide%20to%20food%20handling
www.extension.iastate.edu/Publications/PM1974B.pdf

On-Farm Food Safety: Guide to Cleaning and Sanitizing
Suggested checklists, standard procedures, and schedules to document proper on-farm cleaning and sanitizing practices.
www.extension.iastate.edu/store/ListItems.aspx?Keyword=guide%20to%20cleaning%20and%20sanitizing
www.extension.iastate.edu/Publications/PM1974C.pdf

Cornell University Department of Food Science
Several resources and publications available online.
GAPsNET
Good Agricultural Practices Network for Education and Training. The website shows GAPs-related events provided by the National GAPs Program collaborators.
www.gaps.cornell.edu

Food Safety Begins on the Farm: A Grower’s Guide
Good Agricultural Practices for Fruits and Vegetables

Minimize Pathogen Contamination During Production and Harvest of Fresh Produce

National GAPs Educational Materials
www.gaps.cornell.edu/rks.html

Commercial On-Farm Food Safety Practices
New Mexico State University and University of Hawaii, Manoa. Dr Willis Fedio & Jim Hollyer.
This website offers a general view to commercial farmers of the best on-farm food safety practices.
http://gaps.nmsu.edu/welcome.html

If you need more information about this website and its content, please e-mail:
Dr Willis Fedio Ph.D.,
Microbiologist
New Mexico State University, Physical Science Laboratory,
wfedio@psl.nmsu.edu
Jim Hollyer,
University of Hawaii,
hollyer@hawaii.edu

There is also a 25 min. DVD video available titled Closing the GAPs: Utilizing Good Agricultural Practices that demonstrates the Good Agricultural Practices.
Cost: only shipping and handling fees apply
To order or for more information please contact:
College of Agricultural and Home Economics
Box 30003, MSC 3AI
New Mexico State University
Las Cruces, NM 88003-8003
Or call:
575-646-5368 or toll free: 1-888-750-4156
vstudio@nmsu.edu

The Joint Institute for Food Safety and Applied Nutrition (JIFSAN) has a Good Agricultural Practices manual available online for free at:
www.jifsan.umd.edu/training/gaps_manual.php

The U.S. Food and Drug Administration (FDA) has a variety of guidance documents online regarding food.

October 26, 1998.
This U.S. Food and Drug Administration (FDA) guide provides assistance to U.S. and foreign produce industry in enhancing the safety of domestic and imported produce by addressing common areas of concern in growing, harvesting, sorting, packing, and distribution of fresh produce.
Available online at: www.fda.gov/Food/GuidanceComplianceRegulatoryInformation/GuidanceDocuments/ProduceandPlanProducts/ucm064574.htm
Contact information:
Office of Food and Safety.
U.S. Food and Drug Administration,
5100 Paint Branch Parkway
College Park, MD 20740
301-436-1700
Also, the FDA offers specific documents on crops:

Guides to Minimize Microbial Food Safety Hazards of:

Leafy Greens: [http://www.fda.gov/Food/GuidanceComplianceRegulatoryInformation/GuidanceDocuments/ProduceandPlanProducts/ucm174200.htm](http://www.fda.gov/Food/GuidanceComplianceRegulatoryInformation/GuidanceDocuments/ProduceandPlanProducts/ucm174200.htm)

Melons: [http://www.fda.gov/Food/GuidanceComplianceRegulatoryInformation/GuidanceDocuments/ProduceandPlanProducts/ucm174171.htm](http://www.fda.gov/Food/GuidanceComplianceRegulatoryInformation/GuidanceDocuments/ProduceandPlanProducts/ucm174171.htm)

Tomatoes: [http://www.fda.gov/Food/GuidanceComplianceRegulatoryInformation/GuidanceDocuments/ProduceandPlanProducts/ucm173902.htm](http://www.fda.gov/Food/GuidanceComplianceRegulatoryInformation/GuidanceDocuments/ProduceandPlanProducts/ucm173902.htm)

The New Crops Opportunity Center, from the University of Kentucky Department of Agriculture, provides production and marketing information on new crops and value added versions of current crops. They have a good introductory publication about Good Agricultural Practices: [www.uky.edu/Ag/NewCrops/introsheets/gap.pdf](http://www.uky.edu/Ag/NewCrops/introsheets/gap.pdf)

For more information, contact:
Christy Cassady
Coordinator, New Crop Opportunity Center
N-318 Agricultural Science Center
University of Kentucky
Lexington, KY 40546-0091
859-257-1477
newcrops@uky.edu

Farm Food Safety. On-farm Food Safety from Penn State University. The web page shows you a four-step process to safer farm practices, with different resources from publications, training material and videos. There is also information on training and workshops. [http://foodsafety.psu.edu/gaps](http://foodsafety.psu.edu/gaps)

Rhode Island Food Safety Education. URI Cooperative Extension. Includes information on Rhode Island’s Good Agricultural Practices Grower Certification Program. [www.uri.edu/ce/ceec/food/grow.html](http://www.uri.edu/ce/ceec/food/grow.html)

Kentucky Department of Agriculture: Good Agricultural Practices Educational Resources. A variety of resources from different sources can be found in this website regarding self audits, third party audits, general information, good agricultural practices, microbial contamination, training manuals for farm workers, and also product specific publications (tomatoes, peaches, lemons, etc.) Available on the Web at: [www.kyagr.com/marketing/GAPResources.htm](http://www.kyagr.com/marketing/GAPResources.htm)

North Carolina Market Ready. Fresh Produce Safety. NC Cooperative Extension Fresh Produce Safety – Field to Family is one of the core educational focus areas of NC Market Ready program. Developed for NC Cooperative Extension personnel and NC growers and consumers, the Fresh Produce Safety portal, contains valuable resources and materials, including information on Good Agricultural Practices (GAPs), traceability, training materials, cost share opportunities and more. Visit this portal at: [www.ncsu.edu/enterprises/ncfreshproducesafety](http://www.ncsu.edu/enterprises/ncfreshproducesafety).

**National Good Food Network**

The National Good Food Network is bringing together people from all parts of the rapidly emerging good food system – producers, buyers, distributors, advocates, investors and funders – to create a community dedicated to scaling up good food sourcing and access. The webpage has a variety of resources including publications, news and webinars. [www.ngfn.org](http://www.ngfn.org)

**Ready for an Audit?**

The retail and food service industries are implementing the fresh produce audit verification program in order to verify that farms are producing fruits and vegetables in the safest possible way. These audits are performed by third parties to verify that specific good agricultural practices are being followed.

The Agricultural Marketing Service, together with state departments of agriculture, offers a program based on voluntary audits that confirms adherence to the recommendations made in the Food and Drug Administration’s Guide to Minimize Microbial Food Safety Hazards for Fresh Fruits and Vegetables. If you are interested in this program, please contact:

Kenneth S. Petersen
Audit Programs Coordinator
Fresh Products Branch
1400 Independence Avenue SW
Room 1661, Stop 0240
Washington, DC 20250-0240
Phone: 202-720-4560
FAX: 202-720-8871
ken.petersen@usda.gov

Steve Thomas
California Department of Food and Agriculture
Program Supervisor
CA Fed-State Inspection Service
165 East Tulare
Dinuba, CA 93618
Phone: 559-595-8000
sthomas@cdfa.ca.gov

There are also self audits available on the Internet:

**UC Good Agricultural Practices** offers GAP self audits which allow you to assess the GAPs in use in your business. You can answer the self audit online or print the self audit for your use. The complete document is available for download. [http://groups.ucanr.org/UC_GAPs/GAP_Self-Audits](http://groups.ucanr.org/UC_GAPs/GAP_Self-Audits)
Penn State GAP Self-Audit. This Food Safety self audit is based on the USDA Good Agricultural Practices and Good Handling Practices Verification Program Audit Matrix. http://foodsafety.psu.edu/gaps/Checklist_with_Points2.pdf

Grading, Certification and Verification. The Agricultural Marketing Service (USDA) offers a listing of participating companies that perform third-party audits for the retail and food service industry to verify that there suppliers are in conformance to specific agricultural best practices. www.ams.usda.gov/AMSv1.0/ams.fetchTemplateData.do?template=TemplateN&page=GAPGHPAuditVerificationProgram

The Kentucky Department of Agriculture lists in its website self-audit resources (from Cornell University) as well as third-party audit resources. www.kyagr.com/marketing/GAPResources.htm

The NC Market Ready program also has audits available (self audits and third-party audits) and food safety plans essential to obtain GAPs certification. http://ncsu.edu/enterprises/ncfreshproducesafety/?page_id=2347

What will you do if a food-borne illness is suspected to come from your farm?

The best way to protect yourself is to have proper documentation. A personal food safety manual for your farm is like “insurance” that shows the application of good practices. The University of Massachusetts Extension has a Good Agricultural Practices Food Safety Manual available online for free that can be used as a template for your farm. The manual is available at: www.umassextension.org/nutrition/index.php/programs/food-safety/programs/good-agricultural-practices/gap-manual

For more information on GAPs and help in setting up a Food Safety Plan at your farm, contact:
David Nyachuba
dgn@nutrition.umass.edu
413-545-0552
or
Rich Bonanno
rbonanno@umext.umass.edu
978-361-5650

The Kentucky Department of Agriculture also has a compilation of farm manuals available from different resources to download or click from their website: www.kyagr.com/marketing/GAPResources.htm

Fresh Produce Safety Plan for Field Practices (NC Market Ready). Consumers and retailers are demanding accountability when it comes to producing, buying and selling fresh produce. Developing, implementing and auditing a food safety plan are essential steps in obtaining Good Agricultural Practices (GAPs) certification. NC Market Ready has a compilation of resources useful in this area: http://ncsu.edu/enterprises/ncfreshproducesafety/?page_id=2383

Specific NOP regulations for composted manures:

Policy
“Processed manure may be used as a supplement to a soil building program without a specific interval between application and harvest. As always, producers are expected to comply with all applicable requirements of the NOP regulations with respect to soil quality, including ensuring the soil is enhanced and maintained through proper stewardship.

Processed manure products must be treated so that all portions of the product, without causing combustion, reach a minimum temperature of either 150° F (66° C) for at least one hour or 165° F (74° C), and are dried to a maximum moisture level of 12%; or an equivalent heating and drying process could be used. In determining the acceptability of an equivalent process, processed manure products should not contain more than 1x10³ (1,000) MPN (Most Probable Number) fecal coliform per gram of processed manure sampled and not contain more than 3 MPN Salmonella per 4 gram sample of processed manure.”

The NOP document master list is available on the Web at: www.ams.usda.gov/nop/NoticesPolicies/MasterList.html

And specific regulations for processed animal manures: www.ams.usda.gov/AMSv1.0/getfile?dDocName=STELPRDC5062127

Soil and Compost:

ATTRA Publications

All these publications are available online on our ATTRA website: http://attra.ncat.org or by calling and requesting a free copy at: 800-346-9140.

Alternative Soil Testing Laboratories

This resource list provides a range of soil testing labs and supplies that support the special analytical needs of farmers using organic or sustainable production methods. http://attra.ncat.org/attra-pub/summaries/summary.php?pub=285

Biodynamic Farming and Compost Preparation

Biodynamic agriculture was the first ecological farming system to arise in response to commercial fertilizers and specialized agriculture after the turn of the century, yet it remains largely unknown to the modern farmer and land-grant university system. The contribution of biodynamics to organic agriculture is...
agriculture is significant, however, and warrants more attention. This publication provides an overview of biodynamic farming and includes additional details and resources on the specialized practice of biodynamic composting. 

Farm Scale Composting Resource List
This resource list offers readings, links, associations, software, periodicals and bibliographies on composting at an individual farm scale.

Manures for Organic Crop Production
Livestock manures are an important resource for sustainable and organic vegetable crop production. This publication discusses the problems and challenges associated with using both raw and composted manures and some of the solutions. Because it is a similar material with related concerns, guano is also dealt with in this document. Restrictions on the use of raw manure in organic farming are also discussed.

Notes on Compost Teas
This publication offers a brief discussion of compost teas compared with compost extracts, describes some methods and equipment for compost tea production, and introduces the soil foodweb concept. A list of laboratories that analyze compost tea is provided, along with an annotated list of key literature and links to resources on the Web.

Soil Management: National Organic Program Regulations
The National Organic Program Rule, §205.203, Soil Fertility and Crop Nutrient Management Practice Standard, does not define specific land practices that producers must use. But it does identify general soil management and environmental protection objectives. From these objectives, producers and the organic certifiers they work with must determine whether specific farming practices meet the NOP criteria. This publication provides management guidelines for meeting, and measurable parameters for monitoring, these objectives. It also discusses why these objectives are essential for maintaining sustainable, organic production systems.

Other Soil and Compost Resources
BioCycle: Journal of Composting and Organics Recycling
Advancing composting, organics recycling, and renewable energy.
Available online at: www.jgpress.com/biocycle.htm

Compost Science and Utilization
An online site with different resources for composting science and use.
www.jgpress.com/compostscience/index.html

Composting at Home
A factsheet from the Ohio State University Extension. Available online at: http://ohioline.osu.edu/com-fact/0001.html

Cornell Composting
This website is maintained by the Cornell Waste Management Institute and provides access to a variety of composting educational materials and programs developed at Cornell University.
http://compost.css.cornell.edu/index.html
Also available, the On-Farm Composting Handbook: http://compost.css.cornell.edu/OnFarmHandbook/onfarm_TOC.html

Farmer Information Fact Sheets: Composting
A set of simple procedures for making compost on the land, from grass cuttings and using water hyacinth.
http://ecoport.org/perl/ecoport15.pl?SearchType=slideshowView&slideshowId=92&checkRequired=Y

US Composting Council (USCC)
The USCC is a national, nonprofit trade and professional organization promoting the recycling of organic materials through composting. The USCC is the only national organization committed to the advancement of the composting industry.
www.compostingcouncil.org

Agricultural Composting Basics
From the Ministry of Agriculture, Food and Rural Affairs, Ontario. A very comprehensive factsheet available online at: www.omafra.gov.on.ca/english/engineer/facts/05-023.htm#site

eXtension
An interactive learning environment with diverse publications on topics such as agriculture. They have a search engine to locate Extension offices near you. A good article on manure and compost utilization is available online:

Manure and Compost Utilization on Fruit and Vegetable Crops
www.extension.org/pages/Manure_and_Compost_Utilization_on_Fruit_and_Vegetable_Crops
Also, Making and Using Compost in Organic Agriculture
www.extension.org/article/18567
Other Water and Irrigation Resources
National Institute of Food and Agriculture: Water
American communities and rural areas depend on a safe and reliable water supply. The science and management of water requires consideration of the quantity and quality of water resources and the land management activities that affect these water resources. Through research, education and extension, NIFA water programs provide basic knowledge, application and learning opportunities needed to address agricultural water quality and quantity issues.
www.csrees.usda.gov/water.cfm

Water: Laws, Regulations, Policy, Guidance and Legislation. US EPA
Laws and regulations, policy and Guidance documents, and legislation, US EPA Department of Water.
www.epa.gov/OW/laws.html

NRCS Water Quality and Water Quantity
The NRCS West National Technology Support Center hosts a team of technical specialists that cover a broad range of water quality and quantity issues. Each of nine disciplines provides information, data, software, and support contacts.
www.wsi.nrcs.usda.gov/products/W2Q/W2Q_home.html

The Farm Water Quality Planning Program is a coordinated effort by the University of California Division of Agriculture and Natural Resources, whose goal is to improve water quality education to the irrigated agriculture industry in California.
http://groups.ucanr.org/signup/index.cfm

The National Water Program has the mission of creating and disseminating knowledge that insures a safe and reliable source of water of the appropriate quality to meet the needs of food and fiber production, human health, use and economic growth, maintenance and protection of natural environmental systems.
www.usawaterquality.org

Disinfecting a Domestic Well with Shock Chlorination
This New Mexico State University publication talks about shock chlorination as a disinfection treatment recommended when a domestic drinking water system is contaminated with bacteria. Contamination can occur when the well is installed.
http://aces.nmsu.edu/pubs/_m/m-115.pdf

Analytical and Testing Services
Alternative Soil Testing Laboratories
This resource from ATTRA provides a range of soil testing laboratories and supplies that support the special analytical needs of farmers using organic or sustainable production methods.
The US Composting Council lists a group of STA (Soil Testing Assurance) labs that provide analytical services for STA participants and use TMECC (Test Methods for Evaluation of Compost and Composting). www.compostingcouncil.org/programs/sta/labs.php

Other Agricultural Analytical Laboratories by region:

North Central Region
(Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, Wisconsin)

Universal Analytical Laboratories
891 Eighth Street
Carlyle, IL 62231
Phone: 618-594-2627
Fax: 618-594-2637
ualab@ualab.com

GMS Laboratories
They perform soil tests, including heavy metals, and compost. Different tests available. Contact information:
P.O. Box 61
23877 E 00 North Road
Cropsey, IL 61731
Phone: 309-377-2851
Fax: 309-377-2017
gmslab83@gmslab.com
www.gmslab/pages/home

Olsen's Agricultural Laboratory
210 East 1st Street
McCook, NE 69001
Phone: 308-345-3670
Fax: 308-345-7880
www.olsenlab.com/default.aspx

Northeast region
(Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Washington D.C., West Virginia)

Agricultural Analytical Services Lab
Wide range of services including soil (heavy metals), manure and compost, water, plant tissue, and others. Contact information:
Penn State University
Tower Rd.
University Park, PA 16802
Phone: 814-863-0841
Fax: 814-863-4540
aasl@psu.edu
www.aasl.psu.edu

UVM Agricultural and Soil Testing Laboratories
Provides soil (including heavy metals), manure and compost testing. Contact information:
Agricultural and Environmental Testing Lab
Jeffords Hall, Room 262
63 Carrigan Drive
University of Vermont
Burlington, VT 05405-1737
Phone: 802-656-3030
Fax: 802-656-0285
Joel.Tilley@uvm.edu / dros@uvm.edu
www.uvm.edu/psu/ag_testing

Analytical Laboratory and Maine Soil Testing Service
5722 Deering Hall
Orono, ME 04469-5722
Phone: 207-581-3591
Fax: 207-581-3597
http://anlab.umesci.maine.edu

South Region
(Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, Puerto Rico, US Virgin Islands)

Waters Agricultural Laboratories Inc.
Soil analysis (including heavy metals), water analysis and other services relevant to agriculture. Located in Georgia and Kentucky. Contact information:
257 Newton Rd.
P.O. Box 382
Camilla, GA 31713
or
2101 Calhoun Rd.
Highway 81
Owensboro, KY 42301
Phone: 229-336-7213
Fax: 229-336-7967
info@watersag.com
www.watersag.com/frame.htm

Soil, Water and Forage Analytical Laboratory
045 Agricultural Hall
Stillwater, OK 74078
Phone: 405-744-6630
Fax: 405-744-9575
soiltesting@okstate.edu
www.soiltesting.okstate.edu/index.htm

A&L Eastern Laboratories, Inc.
7621 Whitepine Rd.
Richmond, VA 23237
Phone: 804-743-9401
Fax: 804-271-6446
office@al-labs-eastern.com
http://al-labs-eastern.com/index.html
Other Useful Resources:

The United States Environmental Protection Agency (EPA) helps you find environmental information about the area where you live, regarding possible contamination in water, soil and air. The website is: www.epa.gov/epahome/whereyoulive.htm. The EPA also offers a list of environmental agencies by state: www.epa.gov/epahome/state.htm

The EPA has a very complete and informative Web page on compost: www.epa.gov/epawaste/conserve/rrr/composting/index.htm

Keeping Feces on the Farm. Science Now.

This article reveals the advantage of spray irrigation compared to older flood irrigation techniques. Spray irrigation appears to reduce transport of pathogens into drinking water wells. This is especially a concern for livestock farming operations, which are increasingly worried about liability from E. coli and similar cases of infection.

http://news.sciencemag.org/sciencenow/2010/06/keeping-feces-on-the-farm.html

Best On-Farm Food Safety Practices: Documenting Trace-Back and Trace-Forward of Harvested Produce

Helpful publication from the College of Tropical Agriculture and Human Resources, University of Manoa at Hawaii. This document gives a good description of a traceback system, mostly oriented for a larger farm, but the principles are the same. www.ctahr.hawaii.edu/oc/freepubs/pdf/FST-36.pdf
Sample Record Keeping Form for Compost/Manure Application and for Compost Production

Manure Applications log

From: National GAPs Education Materials, Cornell University Department of Food Science: www.gaps.cornell.edu/rks.html

<table>
<thead>
<tr>
<th>Date</th>
<th>Field Applied</th>
<th>Rate</th>
<th>Incorporated (Yes or No)</th>
<th>Supplier</th>
<th>Crop Planted (Type and Date)</th>
<th>Crop Harvested (Date)</th>
<th>Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Reviewed By: Title: Date:

Compost Production Record


<table>
<thead>
<tr>
<th>Farm Name:</th>
<th>Production Year:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Compost Pile, Windrow, or Unit I.D.:</th>
<th>Date Started:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Compost Production Method Used (circle one):</th>
<th>windrow</th>
<th>in-vessel</th>
<th>static aerated pile</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Feedstocks Used (including inoculants): (see other side for approximate C:N ratios of common feedstocks)

<table>
<thead>
<tr>
<th>Dates</th>
<th>Temperature</th>
<th>Turned?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Other publications in ATTRA’s Illustrated Series of publications

The Organic Chronicles
› Available in English, Hmong, and Spanish

Start a Farm in the City
› Available in English and Spanish

New Markets for Your Crops
› Available in English and Spanish, and as an audio download in Spanish

Illustrated Guide to Sheep and Goat Production
› Available in English, Hmong, and Spanish

Finding Land to Farm
› Available in English and Spanish

Organic IPM Field Guide
› Available in English and Spanish

Illustrated Guide to Growing Safe Produce on Your Farm: GAPs
By Pamela Wolfe and Rex Dufour
NCAT Agriculture Specialists
© 2010 NCAT
Robert Armstrong, Illustrations
Karen Van Epen, Editor
Robyn Metzger, Production

This publication is available on the Web at:

IP382
Slot 379
Version 011911
Creating a Field Map with Google Maps

An accurate map of your farm is a foundation piece in your GAP manual. Without a clearly drawn map with your fields delineated, it will be difficult for you to prove to your auditors that you can provide a full traceback of your farm’s products. In addition, you may be able to see potential risks in the aerial view of the farm that you might not have noticed before.

Your field map should contain the name, address and contact information of your farm as well as the fields outlined and labeled with the current year’s crop. If you put together a field map in Microsoft Word, updating information from year to year is easy.

Using a Google Map picture as a base for your Field map is pretty straightforward. The steps are outlined for you below.

1. Go to Google Maps by clicking on the “Maps” link in the upper left hand corner of the Google home page. See the link circled in the picture below.

2. Enter the address in the search bar. See the search bar circled in the picture below. Pressing the “Search Maps” button will bring up the area that has the parcels on it.
3. Toggle on the satellite imagery by pressing the “Satellite” button. The Satellite button is circled below. Pressing it will bring up the aerial photography.

4. Adjust the map to capture the fields you want by dragging them into view on the screen. Then press the print screen button in the upper right hand corner on your keyboard. Open the “Paint” program on your computer. You can find it in the Accessories folder. “Paint” is circled in the picture below.
5. Once the program opens, paste the screen in the blank open window. The two screenshots below show the before and after pasting into a Paint window.

6. Cut the area of the map you want and save it as a JPEG file for import into Word or another word processing program.
7. Open Microsoft Word and insert the JPEG into the new Document. You can see the insert picture button circled in the screenshot below.

![Insert Picture from File](image)

8. Add the title and contact information around the map. Then either use the box tool or draw boxes around each of your fields.

![Map with Title and Contact Information](image)